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 BRITISH PETROLEUM PLC *EP -169.743-A

25.07.84-GB-018975 (29.01.86) B01j-23/58 C07c-1/4

Prepn. of cerium oxide catalyst with low ruthenium content - for
 prodn. of hydrocarbon(s) with low methane content from synthetic
 gas

C86-012593 E(BE DE FR GB IT NL)

E(10-J2D, 35-X) H(4-E5, 4-F2E) J(4-E4) N(1-A, 2-E, 3-A)

USE

As catalyst, after reductive activation, in conversion of
 synthesis gas to 2C or higher hydrocarbons (claimed).

ADVANTAGE

Prodn. of CH₄ and CO₂ is lower.

PREFERRED CATALYST

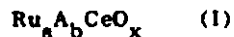
The catalyst contains less than 0.5% Ru and more than 0%
 and up to 5% alkali (esp. K). Salts of Ru and Ce are mixed
 in aq. soln., at 0-100 (80-100; or below 30) °C. The final
 pH in (A) is 6-10. The ppte. may be (C) heated at 250-600°
 C, esp. in N₂ or air, to decompose the cpds. Reductive
 activation is at raised temp., with a reducing gas, esp. at
 150-350° C and 1-100 bars, for up to 24 h., in H₂.

CLAIMED PROCESS

More than 1C hydrocarbons are prepd. by contacting
 syngas with the reductively activated catalyst, at 190-400
 (250-350) °C and 0-100 (10-50) bars. A zeolite, esp. of the
 MFI type and in the H form, may be mixed with the compsn.
 before or after reductive activation; the catalyst is then esp.
 free from alkali metal. The ratio by vol. of catalyst compsn.:

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A compsn. of formula



is prepd. by (A) combining in soln. sol. salts of Ru and Ce
 and a precipitant which is a carbonate and/or bicarbonate
 and/or hydroxide of an alkali metal or NH₄, to form a ppte.
 contg. Ru and Ce as cpds. which can be thermally decomposed
 to the oxides, and (B) recovering the ppte.

A = an alkali metal;

x = a number such that the valency requirements of the other
 elements for O are satisfied;

a = greater than 0 and less than 1% w/w, w.r.t. total wt. of
 the compsn.;

b = 0-10% w/w, w.r.t. total wt. of the compsn.; and
 Ce and O form the remainder of the compsn.

zeolite is 5:1 - 1:5.

EXAMPLE

(a) A soln. of 0.31 g. RuCl_3 in 30 ml. water was added to a soln. of 68.8 g. $\text{Ce}(\text{NO}_3)_3$ in 200 ml. water. The mixt. was heated to 80-85° C, and a soln. of 150 g. K_2CO_3 in 1000 ml. water was added at 25 ml./min. to give pH 8.5-9.5 (225 ml.). The mixt. was boiled for 12 mins., heating was stopped and stirring was continued for 20 mins. After standing overnight, the ppt. was sepd. and dried. (b) The catalyst was reduced in a stream of H_2 at 225° C for 17 h. Syngas ($\text{CO}:\text{H}_2 = 1:2$ molar) was then fed into the reactor at a feed rate of 2500/h., 349° C and 20 bars. The molar selectivity was: CO_2 17%, CH_4 9%, 2-4C 22%, 5+C 52%. The productivity to 5+C was 216 g./l. catalyst/h. CO conversion was 80%. (17pp510RHDwgNo0/0).
(E)ISR: FR2194482 GB2119277.